

IN THE CLAIMS:

1. (cancelled)

2. (cancelled)

3. (currently amended) A method of operating a magnetic resonance imaging system having a first coil having a field C1 and a second coil having a field C2 to achieve imaging volumes, said method comprising:

in a first mode, achieving a small imaging volume by using a sum field from both of the coils; and

in a second mode, achieving a large imaging volume by using a difference field from both of the coils;

reversing the magnetic field from the second coil to change from the first mode to the second mode, ~~A method in accordance with Claim 1~~

wherein a field for the small imaging volume is B1, and a field for the large imaging volume is B2, ~~the field from the first coil is denoted as C1 and the field from the second coil is denoted as C2,~~ said method comprising selecting C1 and C2 such that $C1 + C2 = B1$, and $C1 - C2 = B2$.

4. (currently amended) A method of operating a magnetic resonance imaging system having a first coil and a second coil to achieve an imaging volume, said method comprising:

in a first mode, achieving the imaging volume by using a sum field from both of the coils; and

in a second mode, achieving the imaging volume by using a difference field from both of the coil, ~~A method in accordance with Claim 1~~

wherein P1 and S1 are primary and shield radii for the first coil, P2 and S2 are primary and shield radii for the second coil, and $P1 < P2 < S1 < S2$, said method comprising achieving the current density for a small imaging volume coil by assuming that the primary and shield radii are P2 and S1 respectively and denoting the current density by D1.

5. (original) A method in accordance with Claim 4 further comprising achieving the current density for a large imaging volume coil by assuming that the primary and shield radii are P2 and S2 respectively and denoting the current density by D2.

6. (original) A method in accordance with Claim 5 further comprising denoting the initial current density for coil C1 by $E1 = 0.5 * (D1 + D2)$.

7. (original) A method in accordance with Claim 5 further comprising denoting the initial current density for coil C2 by $E2 = 0.5 * (D1 - D2)$.

8. (currently amended) A method in accordance with ~~Claim 4~~ Claim 3 further comprising switching between the first mode and the second mode.

9. (cancelled)

10. (currently amended) A system in accordance with ~~Claim 9~~ Claim 13 further comprising a switch configured to change a mode of operation of said system from the first mode to the second mode.

11. (original) A system in accordance with Claim 10 wherein the switch is a circuit.

12. (cancelled)

13. (currently amended) A magnetic resonance imaging (MRI) system comprising:

at least one first coil; and

at least one second coil electromagnetically coupled to said first coil;

said imaging system configured to:

operate in a first mode to obtain a small imaging volume by using a sum field from said first coil and said second coil; and

operate in a second mode to obtain a large imaging volume by using a difference field from said first coil and said second coil;

said system further configured to reverse the magnetic field of the second coil in the second mode compared to the first mode, and ~~A system in accordance with Claim 9~~ wherein a field for the small imaging volume is B1, and a field for the large imaging volume is B2, ~~the field~~ a field from said first coil is denoted as C1 and ~~the field~~ a field from said second coil is denoted as C2, and C1 and C2 are selected such that $C1 + C2 = B1$, and $C1 - C2 = B2$.

14. (currently amended) A magnetic resonance imaging (MRI) system comprising:

at least one first coil; and

at least one second coil electromagnetically coupled to said first coil;

said imaging system configured to:

operate in a first mode to obtain a small imaging volume by using a sum field from said first coil and said second coil; and

operate in a second mode to obtain a large imaging volume by using a difference field from said first coil and said second coil; ~~A system in accordance with Claim 9~~

wherein P_1 and S_1 are primary and shield radii for said first coil, P_2 and S_2 are primary and shield radii for said second coil, and $P_1 < P_2 < S_1 < S_2$, the current density is achieved for a small imaging volume coil by assuming that the primary and shield radii are P_2 and S_1 respectively and denoting the current density by D_1 .

15. (original) A system in accordance with Claim 14 further comprising achieving the current density for a large imaging volume coil by assuming that the primary and shield radii are P_2 and S_2 respectively and denoting the current density by D_2 .

16. (original) A system in accordance with Claim 15 further comprising denoting the initial current density for coil C1 by $E_1 = 0.5 * (D_1 + D_2)$.

17. (original) A system in accordance with Claim 15 further comprising denoting the initial current density for coil C2 by $E_2 = 0.5 * (D_1 - D_2)$.

18. (cancelled)

19. (cancelled)

20. (currently amended) A method of imaging an object utilizing a magnetic resonance system, said method comprising:

imaging a first volume using a sum field from a first coil and a second coil;
and

imaging a second volume using a difference field from the first coil and the second coil, including reversing the magnetic field of the second coil to switch from the sum field to the difference field, ~~A method in accordance with Claim 18~~

wherein a field for the first imaged volume is B_1 , and a field for the second imaged volume is B_2 , ~~the field a field~~ from the first coil is denoted as C_1 and ~~the field a field~~ from the second coil is denoted as C_2 , said method comprising selecting C_1 and C_2 such that $C_1 + C_2 = B_1$, and $C_1 - C_2 = B_2$.

21. (currently amended) A method in accordance with Claim 20, ~~Claim 18~~ wherein P1 and S1 are primary and shield radii for the first coil, P2 and S2 are primary and shield radii for the second coil, and $P1 < P2 < S1 < S2$, said method further comprising achieving the current density for the first imaged volume coil by assuming that the primary and shield radii are P2 and S1 respectively and denoting the current density by D1.

22. (original) A method in accordance with Claim 21 further comprising achieving the current density for the second imaged volume coil by assuming that the primary and shield radii are P2 and S2 respectively and denoting the current density by D2.

23. (original) A computer readable medium encoded with a program configured to instruct a computer to:

energize a first coil and a second coil in a first mode to obtain an imaging volume by using a sum field from the first coil and the second coil; and

energize the first coil and the second coil in a second mode to obtain an imaging volume by using a difference field from the first coil and the second coil.

24. (original) A computer readable medium in accordance with Claim 23 wherein said program further configured to receive a mode indication from a user.

25. (original) A computer configured to:

receive a mode indication including a small mode and a large mode;

energize a first coil and a second coil in a first mode to obtain an imaging volume by using a sum field from the first coil and the second coil when the indication is large mode; and

energize the first coil and the second coil in a second mode to obtain an imaging volume by using a difference field from the first coil and the second coil when the indication is small mode.

26. (New) A method in accordance with Claim 7 further comprising transforming a current density for coil C2, at radius P2, to radius P1, such that an internal field of coil C2 is unchanged.